COMPARISON OF 1 ONG VAI 1 EY TOPSAR DATA WITH KINEMATIC GPS SURVEY MEASUREMENTS

by Scott} Ienslev and Frank Webb
Jet Propulsion] aboratory
4800 Oak Grove Dr.
Pasadena, CA 91109
Telephone: (81 8)-354- 3322
FAX: (818)-393-5285

The JPL/NASA TOPSAR instrument is a C-band airborne interferometric synthetic aperture radar (SAR) that is designed for making topographic maps of the earth's surface. After processing the radar data the topographic maps generated are in the form of digital elevation models (DEMs) which are typically 6x30 km or 12x40km with a vertical resolution of 2m and a horizontal sampling of 5-1 om. The accuracy of this technique has previously been validated by comparing TOPSAR DEMs with DEMs derived from stereo photogrammetry and with GPS surveyed positions for a limited number corner reflectors in the scene. Such comparisons arc limited to areas where high resolution DEMs already exist or surveyed corner reflectors arc present. Deploying corner reflectors can be costly because of their size and shape, and logistically prohibitive because of restricted access to the. area to be imaged. This can limit the number of control points that can be set up to a few points compared to the large number of topographic points in the. scene. An alternative to using photogrammetric DEMs and corner reflector deployment is to use kinematic GPS surveys of topography. GPS positions are insensitive to surface slope and can be used to sample hundreds of control points of feature.s that are easily identifiable in the radar image.. In the results reported here, a TOPSAR DEM from 1 ong Valley, California, is compared with elevations from kinematic GPS surveys of roads in the image. The results agree well with previous estimates of the accuracy of TOP. 'SAR and demonstrate the utility of using kinematic GPS surveys as a ground truth too] for remotely sensed topography in areas without other ground control.

This research described in this paper was carried out at the. Jet Propulsion Laboratory, California 1 n stitute Technology, under contract with the. National Aeronautics and Space Administration.